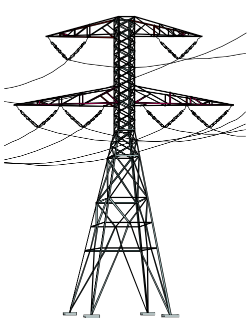
SPCC REQUIREMENTS AND POLLUTION PREVENTION PRACTICES FOR ELECTRICAL UTILITIES

OVERVIEW

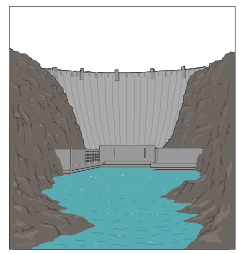
This guide will assist **electrical utilities** with the prevention and control of oil spills. Other guides have been developed to assist other industry sectors in the regulated community. This guide discusses the equipment and operating practices needed to meet the requirements of the Federal Oil Pollution Prevention Regulation found in Title 40 Code of Federal Regulations (CFR) Part 112, which includes the Spill Prevention Control and Countermeasure (SPCC) Plan requirements and the Facility Response Plan (FRP) requirements. The SPCC requirements are the focus of this guide; other guides are available for the facility response planning requirements (40 CFR 112.20 and 112.21) and general information on the Oil Pollution Prevention Regulation.



Recommended practices for pollution prevention and avoiding discharges* of oil are also included in this guide. These practices may also assist facilities in achieving compliance with the SPCC requirements and reduce the possibility of product loss and a discharge.

** A discharge is essentially a spill that reaches a navigable water or adjoining shoreline. The legal definition can be found in 40 CFR 112.2(b).*

APPLICABILITY OF THE SPCC REQUIREMENTS TO ELECTRICAL UTILITIES



EPA's SPCC requirements (40 CFR Part 112.1 through 112.7) apply to nontransportation-related facilities that could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines, and that have (1) a total underground buried storage capacity of more than **42,000** gallons; or (2) a total aboveground oil storage capacity of more than **1,320** gallons, or (3) an aboveground oil storage capacity of more than **660** gallons in a single container.

Some facilities may not be regulated if, due to their location, they could not reasonably be expected to discharge oil into navigable waters of the U.S. or adjoining shorelines. SPCC-regulated facilities must also comply with other federal, state, or local laws, some of which may be more stringent.

This guide is intended for SPCC-regulated facilities engaged in the generation, transmission, and/or distribution of electric power, and that use equipment (e.g., transformers and circuit breakers) which contain dielectric fluid (mineral oil) for insulation, compressor oil, and hydraulic oil. These facilities include power plants (including hydroelectric and cogeneration facilities), substations, switching stations, customer installations, test facilities, and equipment storage and maintenance facilities.

What are Navigable Waters of the U.S.?

The legal definition for navigable waters is defined generally under Clean Water Act (CWA) Section 502(7). EPA's regulatory definition can be found at 40 CFR 110.1.

For the purposes of 40 CFR Part 112, the term *navigable waters* means the waters of the United States, including the territorial seas, and includes:

- All waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide.
- All interstate waters, including <u>interstate</u> wetlands, mudflats, and sandflats;
- All other waters such as <u>intrastate</u> lakes, rivers, streams (including intermittent streams), wetlands, mudflats, sandflats, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any waters that could be used for recreational purposes, or from which fish or shellfish could be taken and sold in interstate or foreign commerce; or that are used or could be used for industrial purposes by industries in interstate commerce.

The CWA has been interpreted to cover all surface waters, including any waterway within the U.S. Also included are normally dry creeks through which water may flow and ultimately end up in public waters, such as a river, stream, tributary to a river or stream, lake reservoir, bay, gulf, sea, or ocean within or adjacent to the U.S. The CWA's jurisdictional reach may also include groundwater **<u>if</u>** it is directly connected hydrologically with surface waters.

Operations related to SPCC at these facilities include the transfer of oil for maintenance activities, the storage of fuel oil for powering generators during emergencies or for power plant startup, and the storage of insulation (dielectric) oil in electrical equipment (e.g., transformers, oil circuit breakers, capacitors, regulators). Some facilities are moving towards using sulfur hexafluoride (SF_6) gas for insulating circuit breakers. These circuit breakers do not contain oil for insulation purposes, but they do contain small amounts (e.g., two gallons) of compressor oil.

Many electrical utilities are subject to the SPCC regulation, and some utilities may be subject to the Facility Response Plan (FRP) requirements under 40 CFR 112.20 and 112.21 and associated appendices. All owners or operators of SPCC-regulated facilities should determine whether the facility poses a threat of substantial harm to the environment. All facilities must document this determination by completing the "Certification of the Applicability of the Substantial Harm Criteria Checklist," provided as Attachment C-II in Appendix C of 40 CFR 112. This certification should be kept with the facility's SPCC Plan.

As outlined in 40 CFR 112.20(f)(1), a facility has the potential to cause substantial harm and, therefore, must prepare an FRP if:

- The facility transfers oil over water to or from vessels **and** has a total oil storage capacity, including both aboveground storage tanks (ASTs) and underground storage tanks (USTs), greater than or equal to 42,000 gallons; or

- The facility's total oil storage capacity, including both ASTs and USTs, is greater than or equal to one million gallons, **and one of the following is true**:

  ⇨ The facility lacks secondary containment that is able to contain the capacity of the largest AST within each storage area plus freeboard to allow for precipitation;

- ⇨ The facility is located at a distance such that a discharge from the facility could cause injury to an environmentally sensitive area;

- ⇨ The facility is located at a distance such that a discharge from the facility would shut down a public drinking-water intake; or

- ⇨ The facility has had a reportable spill greater than or equal to 10,000 gallons within the last five years.

Many power-generating facilities are located adjacent to or over water; so if their aggregate storage (including oil-filled electrical equipment, fixed and mobile storage tanks, etc.) is more than one million gallons, they are likely to be subject to the FRP requirements as well. These facilities are likely to be required to prepare an FRP because a discharge from the facility has a high potential to cause injury to an environmentally sensitive area or shut down a public drinking water intake.

SPCC AND SPECIFIC SPILL PREVENTION REQUIREMENTS FOR ELECTRICAL UTILITIES

SPCC: Preparation and Certification [40 CFR 112.3]

The owner or operator of an SPCC-subject facility is required to have a written site-specific spill prevention plan, which details how a facility's operations comply with the requirements of 40 CFR 112.

Requirements for specific elements to be included in the SPCC Plan are found in 40 CFR 112.7. The SPCC Plan must be reviewed and certified by a Registered Professional Engineer who is familiar with SPCC and has examined the facility. To be in compliance, the facility's SPCC Plan must satisfy all of the applicable requirements for drainage, bulk storage tanks (including oil-filled electrical equipment), tank car and truck loading and unloading, transfer operations (intrafacility piping), inspections and records, security, and training. Most importantly, the facility must fully implement the SPCC Plan. Newly constructed facilities and facilities that make modifications must prepare or revise their SPCC Plan within six months. Modifications may include, for example, changes in piping arrangements or installation or removal of tanks.

The SPCC Plan must:

- ✓ Be kept onsite.
- ✓ Have the full understanding of all employees involved in facility operations.
- ✓ Be certified by a Registered Professional Engineer (PE).
- ✓ Have full management approval.
- ✓ Conform with all SPCC requirements in 40 CFR 112.
- ✓ Discuss spill history.
- ✓ Discuss spill prediction (i.e., direction of flow).
- ✓ Be reviewed every three years by management.
- ✓ Be amended/certified by a PE for modifications.

Containment and Diversionary Structures Appropriate for Electrical Utilities [40 CFR 112.7(c)]

SPCC requires containment of drainage from the operating areas of a facility to prevent oil spills and contaminated runoff from reaching storm drains, streams (perennial or intermittent), ditches, rivers, bays, and other navigable waters.

Secondary containment or diversionary structures must be in place to control oil-contaminated drainage (e.g., rainwater) or leaks around electrical equipment and associated pipelines, valves, and joints and storage tanks. For these purposes, facilities should use dikes, berms, curbing, culverts, gutters, trenches, retention ponds, weirs, booms, and other barriers as appropriate.

SPCC requirements are performance-based, which permits facility owners and operators to substitute alternative forms of spill containment if the substitute provides substantially equivalent protection against discharges to navigable waters to that provided by the systems listed in 40 CFR 112.7(c).

To safeguard against potential electrical hazards associated with standing water in electrical yards, facilities should use a containment and diversionary system which continuously directs water away from electrical equipment. Culverts and retention ponds can satisfy the requirements for drainage control and containment. Cable conduit ditches with trays which extend above the surface can serve as part of a diversionary system as well.

In accordance with industry safety codes for the prevention of electrical and fire hazards, electrical substations surround electrical equipment with gravel beds, also known as "chipseal." The subgrade beneath the gravel should be designed using good engineering practices to prevent the migration of contaminants through the soil. These gravel beds also aid in the retention of contaminants and help prevent spilled dielectric fluid from spreading. Facilities should consider installing surface drains beneath the gravel or use other methods for controlling drainage (e.g., perimeter ditches and swales).

What is an Oil?

Oils are defined under several statutes including the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). As a result, overlapping regulatory interpretations exist. For this reason, the U.S. EPA and the U.S. Coast Guard are currently developing a nationally consistent program policy and methodology for facilities to determine whether a given substance is considered an oil under the existing CWA.

Under the CWA, the definition of oil includes oil of any kind and any form, such as petroleum and nonpetroleum oils. Generally, oils fall into the following categories: crude oil and refined petroleum products, edible animal and vegetable oil, other oils of animal or vegetable origin, and other nonpetroleum oils.

Many substances are easily recognizable as oils (e.g., gasoline, diesel, jet fuel, kerosene, and crude oil). Under the CWA definition, many other substances are considered oils, which may not be easily recognizable by industry, including mineral oil, the oils of vegetable and animal origin and other nonpetroleum oils. Therefore, facilities should work closely with the EPA and USCG (if applicable) to make determinations for the substances they store, transfer, and refine.

Contingency Planning

If a facility determines that the installation of diversionary structures or equipment is not practicable, then this must be clearly demonstrated (40 CFR 112.7(d)). In addition, the facility must have:

- ☞ a strong oil spill contingency plan following 40 CFR Part 109; and
- ☞ a written commitment of manpower, equipment, and materials required to expeditiously control and remove any harmful quantity of oil which has the potential to be discharged from the facility.

The following is a sample outline containing essential elements of a contingency plan for the purposes of 40 CFR 112.7(d)(7).

Facility Specific Items:
Name and location of substation
County
Telephone
Latitude
Longitude
Nearest navigable waterway
Total volume of storage capacity on site
Major equipment with individual capacities
Possible spill scenarios
Site-specific considerations (e.g., location of cable troughs, adequate secondary containment)
A diagram of each facility and the direction of flow to the navigable waterway.

Introduction:
Purpose of plan, revision and distribution, management approval, spill prevention, control and countermeasures, training of personnel.

Responsibilities:
Labs, Safety, Manager, Services, On-Scene Coordinators, Operators.

Spill Reporting:
Emergency contacts, written reports.

Spill Response & Cleanup Procedures:
Discovery and notification, control and containment, regulatory reporting, sampling and testing, cleanup and waste packaging, PCB fire incidences.

Health & Safety:
Types of PPE, when to wear and not wear chemical PPE, personal safety procedures.

Manpower & Equipment:
Extensive list of what departments and who is available when and where and what materials and equipment are stored.

Contractors/Disposal Facilities

Forms Used

Laboratory Analysis

Facility Drainage [40 CFR 112.7(e)(1)]

Diked Areas

Facilities most often use poured concrete walls or earthen berms to contain drainage and provide secondary containment for storage tanks and curbing and catchment basins for truck loading/unloading areas. These contained areas are considered diked areas. Concrete and earthen dike containment structures around storage tanks may accumulate significant amounts of water. Drain lines, which must be watertight, are usually installed through the dike walls and are used to drain accumulated stormwater from the diked area. These lines should be fitted with valves or other positive means of closure that are normally sealed closed and locked to prevent any oil discharges from escaping the diked area. These valves must be open-close manual valves; flapper valves are not acceptable.

These valves must be opened to drain rainwater and resealed following drainage by trained and authorized facility personnel only. Adequate records must be kept of such drainage events (i.e., date, time, personnel names) and made part of the SPCC Plan.

The accumulated rainwater must be examined and determined to be free of oil contamination before diked areas are drained. If any oil sheen or accumulation of oil is observed, an alternate method of draining the diked area must be employed. The contaminated water may be diverted to an onsite treatment plant or oil-water separator; however, the adequacy of these systems is determined on a case-by-case basis for each one's adherence to good engineering practices and ability to retain a spill in the event of a system malfunction.

Another alternative is to pump out diked areas with a manual pump or vacuum truck. Any oil-contaminated water must be transported to an appropriate waste-handling facility for disposal or treated on site.

Undiked Areas

Other operating areas of an electrical utilities facility which are not contained by dike walls are considered undiked areas. Drainage must be controlled for these areas which may include electrical yards with oil-filled electrical equipment and associated pipelines and valves, truck loading and unloading areas, and drum storage areas. All undiked areas can be designed to control drainage through a combination of curbing, trenches, catchbasins, and oil-water separators as necessary to retain a spill.

For example, some electrical yards are graded to drain to swales which direct drainage to concrete retention ponds restrained by valves. Other electrical yards may be designed with containment curbing which directs drainage through drain inlets to underground piping systems which empty to drainage retention structures. In either case, the contents of the drainage retention structure must be examined for contamination prior to discharge.

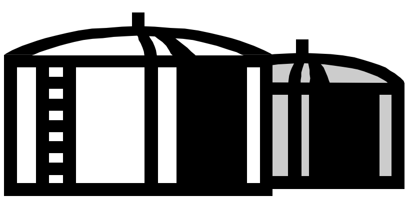
Facilities must document this examination noting the appearance of the rainwater and the time of opening and closing of the valve associated with the retention structure.

Other facilities may use a completely or partially buried oil-water separator system equipped with an inlet valve and a weir and baffle system, which directs the oil to one compartment and the water to another. The oil-water separator must never automatically discharge treated water to a sanitary sewer or anywhere outside a contained area.

Diversionary structures should be examined for their integrity and effectiveness. If a paved area is improperly graded or if a curb is deteriorating, contaminated water may escape from the facility. For this reason, a professional engineer must certify your SPCC Plan to ensure that the drainage system is adequately designed and properly maintained in accordance with good engineering practices.

Whatever techniques are used, the facility's drainage systems should be adequately engineered to prevent oil from reaching navigable waters in the event of equipment failure or human error at the facility.

Oil Storage: Bulk Storage Tanks, Portable Tanks, Drums, and Oil-Containing Equipment [40 CFR 112.7(e)(2)]



Tank Material

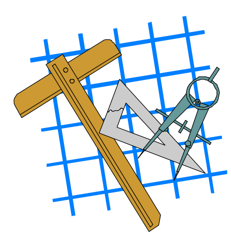
No tank or other equipment should be used for the storage of oil unless its construction material is compatible with the material stored and conditions of storage such as pressure, physical and chemical properties, and temperatures.

It is recommended that the construction, materials, installation, and use of tanks conform with relevant portions of industry standards, such as American Petroleum Institute (API), National Fire Protection Association (NFPA), Underwriters Laboratory (UL), or American Society of Mechanical Engineers (ASME), which may be required in the application of good engineering practices or by state or local regulations.

For assistance with the preparation for natural disasters contact the Federal Emergency Management Agency (FEMA) at (202) 646-FEMA.

Secondary Containment

All equipment containing oil or oil-contaminated water must have secondary containment for the entire contents of the largest single container within the containment area, plus sufficient freeboard to allow for precipitation. For electrical yards an alternative system could consist of a complete drainage trench or culvert arranged so that a spill could terminate and be safely confined in a catchment basin or retention pond. The containment structure(s) must be sufficiently impervious to the types of oil products stored at a facility. Diked areas should be free of pooled oil; spills should be removed promptly.



The volume of freeboard should be based on regional rainfall patterns. Facilities in states with large amounts of rainfall (e.g., Washington, Alaska, and Hawaii, and the Commonwealth of Puerto Rico) will require secondary containment to accommodate greater amounts of water.

Precipitation data is available from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC). The NCDC can be reached by telephone at (704) 271-4800 and at http://www.ncdc.noaa.gov/ol/climate on the worldwide web.

The following table describes the most common secondary containment systems for diked areas (e.g., storage tank areas).

SECONDARY CONTAINMENT SYSTEMS	
Type of System	**Description**
Poured Concrete Walls	Poured concrete walls are strong, fairly watertight, and resistant to petroleum penetration if adequately designed and maintained according to good engineering practices. Limitations: • conventional concrete is not totally impervious to petroleum; any spill left inside a containment area may eventually penetrate the concrete and could contaminate groundwater sources. Therefore, spills inside diked areas should be cleaned up as soon as possible. • the expansion and contraction of piping which runs through containment walls create potential areas of weakness. • grouting in expansion joints requires maintenance to prevent weak points, which may allow petroleum penetration.
Containment Curbs	Containment curbs are similar to speed bumps and are often used where vehicles need to access the containment area. Limitations: • they fill up with rainwater more rapidly than higher containment areas; and • they can be worn down as a result of vehicle crossings.
Containment Pits/Trenches	Pits or trenches are belowgrade containment structures, which may be covered with metal grates and lined with concrete. Limitations: • earthen structures have the potential for groundwater contamination unless constructed with appropriate materials; • if pits and trenches are not properly supported, they deteriorate quickly; and • they pose a danger since people can fall into them if grates are not properly maintained.

SECONDARY CONTAINMENT SYSTEMS	
Type of System	**Description**
Earthen Berms	Earthen berms containing clay or bentonite mixtures are commonly used at very large oil storage facilities. Limitations: • earthen berms are subject to water and wind erosion and require frequent rebuilding; • sandy soil does not effectively contain oil spills; groundwater contamination may result. Impervious liners of clay or synthetic membranes may be required to contain oil spills; and • vegetation inside bermed areas is a fire hazard and restricts the operator's ability to detect spills or defective equipment. In addition, the root systems of plants, such as trees, shrubs or bushes, could degrade the berm and promote leakage.
Concrete Block Walls	Concrete block walls are also commonly used for containment. Limitations: • settling eventually separates or cracks the blocks and destroys the integrity of the wall. • concrete blocks are very porous therefore they do not form liquid-tight seals between mortared joints. • water and ice penetrate the blocks and eventually break them apart due to the different phases of water.

Tank Integrity - Inspections and Testing

Oil-filled electrical equipment and ASTs should be properly maintained to prevent oil leaking from bolts, gaskets, rivets, seams, and any other part of the tank. Personnel should note visible oil leaks on an inspection form and report them to the person in charge of spill prevention. Leaks should be repaired immediately. In some cases, the product in the tank will require removal.

Oil leaks from compressors and other units are a common problem. Leaks must be corrected immediately and the surfaces of containment areas should be kept clean.

Electrical equipment can have low-level alarms or failure alarms installed to detect leakage. Electrical equipment control cases can be equipped with catchpans to prevent compressor oil from leaking into the electric yard.

An area of concern for ASTs is tank bottom deterioration. Tank bottoms may be subject to extensive corrosion, which may not be evident during visual inspections. Measures must be taken to prevent this corrosion based on the type of tank installation and tank foundation. Corrosion protection can be provided by dielectric coatings and carefully engineered cathodic protection. Some facilities have installed double-bottom tanks to reduce the corrosion factor.

Corrosion of a tank's surface may also result in tank failure. Corrosion that is concentrated in small areas of a tank's surface or "pitting" creates a high potential for tank failure. If tanks are rusty, holes may form causing the tank to leak. Tank supports and foundations should also be inspected for cracks, crumbling, deterioration, and seepage.

ASTs should be subjected to periodic integrity testing. Some of the accepted methods for testing are the following:

- X-ray or radiographic analysis measures wall thickness and detects cracks and crevices in metal.
- Ultrasonic analysis measures shell metal thickness.
- Hydrostatic testing shows leaks caused by pressure.
- Visual inspection detects some cracks, leaks, or holes.
- Magnetic flux eddy current test used in conjunction with ultrasonic analysis detects pitting.

Internal Heating Coils

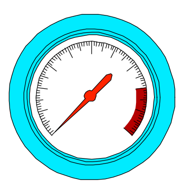
Internal steam-heating coils are often used in fuel oil tanks to maintain the oil in a fluid, less viscous state in cold weather. The deterioration of the steam-heating coils from internal corrosion can result in product leakage when oil drains through a corroded coil to discharge into a nearby waterway. To control leakage through defective internal heating coils, the following factors should be applied:

- The steam return or exhaust lines from internal heating coils that discharge into an open water course should be monitored for contamination or routed to a settling tank, skimmer, or other separation system to remove oil;
- Consider using external heating coils and insulating the sides of the tank if necessary. Because of the problems encountered with internal steam-heating coils, there has been a movement away from their use to more modern external heat-exchanger systems.

Fail-Safe Devices - Level Gauging Systems and Alarms

When filling tanks or electrical equipment, facilities must take precautions to ensure that the equipment is not overfilled.

When transferring insulating oil to electrical equipment, great care must be exercised to ensure that an overfill does not occur. Some electrical equipment can be equipped with high-level alarms (many are equipped with low-level alarms to detect leakage). Facilities should ensure that the capacities of the equipment are accurately accounted for, and transfers should be continuously monitored.



For ASTs, level gauging systems must be selected in accordance with good engineering practices based on the size and complexity of operations at a facility. It is not adequate to only "stick" a tank. A second overfill protection measure should be used as a backup. Some trucks have automatic shutoff systems, which shut off the pump once the meter reaches the volume of product that has been determined to be a safe fill level (e.g., 90% of capacity). Larger tanks may be designed with gauges, high-level alarms, and high-high level alarms to satisfy this requirement. The following table provides examples of some acceptable systems.

LEVEL GAUGING SYSTEMS AND ALARMS	
Type of System	**Description**
Direct Sight Level Gauges	In the simplest case, the gauge is a small-diameter glass or plastic tube vertically attached to two openings in the tank shell. Liquid level in the tank is shown by the level in the tube. Another common sight level gauge is a float gauge. A float rides on top of the liquid in the tank and moves a marker attached to a cable or chain on the outside of the tank. The marker moves up or down with the product level in the tank.
Digital Computers or Telepulse	Telepulse is a simple and accurate system for remote supervision of storage tank liquid levels and temperatures. The unit consists of a transmitter and receiver to relay and receive tank temperature and product level readings. Digital computers can be tied in to display data at more than one location. Portable fill alarm systems are also available that can be used while liquid cargoes are transferred from a storage container into a transportation vehicle. Many variations of these systems are in use.
High Liquid Level Alarms	High liquid level alarms are usually tied into a float gauge or level gauging system. The alarms produce an audible or visual signal when the liquid level in the tank reaches a predetermined height. In older systems, a simple sound is produced by air motion; this is called an audible air vent.
High Liquid Level Pump Cutoffs	This consists of a fill-level alarm connected to a pump control that automatically shuts down the pump when a preset liquid level is reached. This system eliminates the possibility of human failure and is effective at stopping overfilling of tanks.
Direct Audible/Code Signal Communication	This system consists of communication between the tank gauger and pumping station and relies on human perception of liquid levels in the tanks and pumping rates to avoid overfilling tanks. Human error could cause a spill if the tank gauger or pumping station misreads an audible or code signal to start or stop pumping. Communication between the gauger and pump station is usually through two-way radio.

LEVEL GAUGING SYSTEMS AND ALARMS	
Type of System	**Description**
Additional Safety Features	Relief valves and overflow lines are part of safety and level control systems on most petroleum storage tanks. Valves for pressure and vacuum relief will prevent tank damage but may result in a spill or discharge of liquid. Excess liquid may be allowed to flow into another tank through an overflow line. Vacuum vents prevent a tank from collapsing when liquid is pumped out of the tank.

REMEMBER

- ☞ Regardless of the system employed, all equipment must be inspected, calibrated and tested regularly.
- ☞ Even if a tank is leased from the oil supplier, it is ultimately the facility's responsibility if a spill occurs. Therefore, facilities must ensure that leased tanks are also engineered to prevent overfilling.

Underground Storage Tanks

When compared to ASTs, USTs have some advantages for storing petroleum products, such as reduced vapor loss, increased safety, efficient land use and greater security. The obvious disadvantages are undetected leaks and higher corrosion factors for metal tanks. Fiberglass-reinforced plastic tanks are commonly used for storing petroleum products underground. They have a distinct advantage over metal tanks in being corrosion-free. Corrosion-resistant coatings are also available.

Steel USTs should be protected from corrosion by coatings, cathodic protection, or other effective methods compatible with local soil conditions. Underground corrosion of metal surfaces is a direct result of an electric current that is generated by the reaction between the metal surfaces and chemicals present in the soil and water. The flow of current from one portion of the tank to another causes metal ions to leave the surface of the metal, creating pits. The rate of destruction of the metal is directly related to soil moisture and chemical makeup.

All USTs should also be subjected to regular pressure testing and adequate records must be kept of such tests. These records must be made part of the SPCC Plan and kept for at least three years.

The Federal UST regulations found in 40 CFR Part 280 have technical requirements consistent with the underlying regulatory purposes of the SPCC program and are equally protective for purposes of preventing discharges of oil into waters of the United States. These regulations contain provisions for corrosion protection, leak detection, tank overfill and spill prevention equipment, and tank tightness testing. Facilities should refer to the full text of 40 CFR Part 280 when making determinations of compliance.

For More Information On Cathodic Protection Consult:

American Petroleum Institute (API) Recommended Practice 1632:*Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems*
Phone (202) 682-8000.

National Association of Corrosion Engineers (NACE) International Recommended Practice RP-0285-85: *Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems*
Phone (713) 492-0535

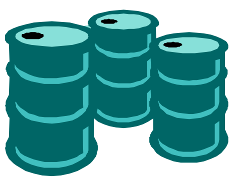
NACE International Recommended Practice RP-0169-92:*Control and Corrosion on External Underground or Submerged Metallic Piping Systems*
Phone (713) 492-0535

Steel Tank Institute (STI) R892-91: *Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems*
Phone (202) 682-8000.

Partially Buried Storage Tanks

Partially buried metallic storage tanks used for petroleum storage should be avoided unless the buried section of the shell is adequately coated. Partial burial in damp earth can cause rapid corrosion of metallic surfaces due to water collecting at the soil surface. Protective corrosion-resistant coatings and cathodic protection should be used to prevent corrosion. Partially buried tanks are considered to be aboveground tanks and are subject to the same requirements as other aboveground tanks under the provisions of 40 CFR Part 112 due to their potential threat to surface waters.

Portable Oil Storage Containers



Mobile or portable oil storage tanks (including trucks containing product), 55-gallon drums, and other small containers should be positioned or located so as to prevent spilled oil from reaching navigable waters. A secondary means of containment, such as dikes, basins, or spill pallets, must be provided. The containment area must hold the contents of the largest container stored in the area. Many facilities keep drums and portable oil tanks inside covered, contained warehouse storage areas. It is best to have a covered area to reduce exposure to the elements so that the containers remain in good condition and runoff is eliminated.

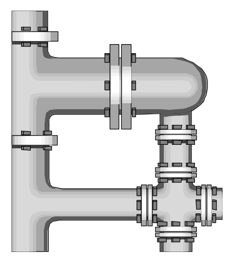
These storage areas must be located where they will not be subject to periodic flooding or washout.

Containment for drums and other small containers does not have to be expensive. If there are a small number of drums, a facility may purchase spill pallets or portable containment devices (e.g., overpack drums) designed for drum containment.

Transfer Operations: Hosing, Pipelines, and Joints [40 CFR 112.7(e)(3)]

Piping may be used at an electrical utility for removing insulation oil from equipment which requires maintenance, for refilling equipment, and/or for filling storage tanks.

Underground cables or partially underground cables (often housed in a "cable tray") are insulated by mineral oil and can be a source of an oil discharge due to a joint failure or other failure. Careful monitoring and maintenance of the insulation are needed.



SPCC requires that the terminal connection at the transfer point be capped or blank-flanged and marked as to origin for a pipeline that is not in service or in standby service for an extended time. Aboveground pipe supports should be designed and spaced in order to prevent sagging, minimize abrasion and corrosion, and allow for expansion and contraction.

Buried piping must have a protective wrapping and coating, and should be cathodically protected if used in corrosive soil conditions. If any section of buried piping is exposed for any reason, it must be examined for deterioration and corrosion and repaired, if necessary. Obviously, buried piping cannot be visually examined and must be subjected to periodic pressure testing, regardless of materials of construction. Plastic or fiberglass-reinforced pipes do not require protective coatings or cathodic protection.

Inspections of Aboveground Pipes, Valves, and Pumps

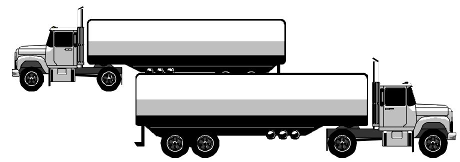
All aboveground pipes and valves should be regularly examined on a scheduled basis by operating personnel. Flange joints, expansion joints, valve glands and bodies, and metal surfaces should be evaluated. Piping in high spill probability areas should be periodically subjected to pressure testing. Pipes, valves, and connecting joints should be free of leaks, drips, and oil-saturated soil underneath. Defective or leaking equipment should be replaced or repaired, and adequate records should be made of such repairs. All records should be made part of the SPCC Plan and kept for at least three years.

Pumps, valves, and gauges are covered under the same regulations as piping. They must be regularly examined by facility personnel. They should be free of leaks, drips, or any defects which could lead to a spill. Soil underneath pumps, valves, and connections should be free of oil stains or pooled oil. Flow valves must be periodically packed with grease to prevent leakage, and gaskets must be replaced periodically. Pumps require periodic rebuilding and connecting lines need to be resealed to prevent leaks.

Warning Signs for Aboveground Pipes

Drivers granted entry into a facility must be verbally cautioned or warned by appropriate signs to assure that their vehicle, because of its size, will not endanger aboveground piping or hosing. Tank truck loading/unloading areas should have appropriate protection for aboveground pipes (e.g., bumper poles) and adequate signs posted to warn drivers of the presence of aboveground pipes in traffic areas.

Tank Car and Tank Truck Loading and Unloading Procedures [40 CFR 112.7(e)(4)]



Electrical utilities may require the use of a tank car or truck for collecting used insulation oil (loading) from holding tanks or for filling tanks which store new insulation oil (unloading).

Electrical utilities may receive product from tanker trucks which may have three 3,000-gallon compartments (sizes vary) or from other smaller trucks.

DOT Procedures

Regardless of the types of tank cars or trucks servicing a facility, all drivers must follow loading/ unloading procedures established by the Department of Transportation (DOT) in 49 CFR Parts 171, 173, 174, 177, and 179.   Training programs should thoroughly address these requirements and procedures should be incorporated into a Standard Operating Procedures (SOP) manual for product transfer. Moreover, facilities should consider ways to ensure that other commercial drivers or contractors are competent in these procedures (e.g., issue driver certifications).

Secondary Containment

Due to their function, tank car and truck loading/ unloading areas have a high probability for spills. Secondary containment systems must be designed specifically for a facility's topography configuration and the size of the tank car/truck loading or unloading at the site.

Loading/unloading areas typically are designed to permit vehicle access, so the design must incorporate a secondary containment system. The most common loading area containment system is a covered, curbed, and graded area that drains to a sump. Drainage should flow into ponds, lagoons, catchment basins, or treatment systems designed to retain oil or return it to the facility. A system that incorporates good engineering practices minimizes the volume of water, ice and snow that enters the containment area.

The containment system must be designed to hold the maximum capacity of the largest compartment of a tank car or truck loaded or unloaded at the facility. If there are separate areas for different unloading or loading operations, each area should be designed specifically to hold the capacity of the largest carrier anticipated to conduct operations in that area. An engineer must look at the entire facility as a unit to determine the adequacy of the spill containment systems in place.

Warning or Barrier System

An interlocked warning light or physical barrier system (such as a brake-interlock system), or warning signs should be provided in loading/unloading areas to prevent a vehicle from leaving before being completely disconnected from the fuel transfer lines.

Prior to filling and departure of a tank car or truck, the lowermost drain and all outlets of such vehicles should be closely examined for leakage. If necessary, valves should be tightened, adjusted, or replaced to prevent leaking in transit.

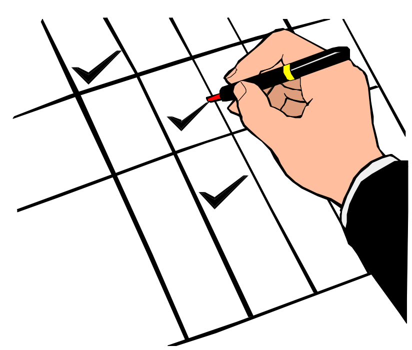
Inspections and Records [40 CFR 112.7(e)(8)]

Inspections are an important part of preventing spills due to equipment or containment system failure. Adequate inspection and maintenance programs are a critical component of a spill prevention program. Inspection and maintenance records provide the only real evidence of compliance testing of storage tanks, piping, level gauging systems, alarms and related equipment.

Records of inspection procedures (including frequencies of inspections), maintenance, and draining of diked areas should be included in the facility's SPCC Plan.

Records of drainage of diked areas are important in determining a facility's compliance, especially when drainage flows directly into a navigable waterway and bypasses in-plant treatment systems.

The following table includes the types of records that should be maintained at a facility. Such records must be kept for a minimum of three years.



INSPECTION AND MAINTENANCE PROGRAM RECORDS	
Aboveground Storage Tanks, Piping, and Other Oil-Filled Equipment	• Regular visual inspections and/or tank integrity testing (e.g., shell thickness testing). • Pipe supports, pipes, valves and pumps (regular visual inspections). • Piping in high risk spill areas (periodic pressure testing). • Storage tank flow valves, supports, foundations (regular visual inspections). • Storage tank level gauges and alarms (regular mechanical function testing/visual inspections).
Underground Storage Tanks and Piping	• Pressure testing of tanks and piping. • Inventory monitoring for leaks. • Testing of cathodic protection system.
Dikes, Berms, Secondary Containment Systems	• Containment dikes and berm integrity (regular visual inspections). • Records of drainage of rainwater from diked containment areas (must be recorded whenever areas are drained). • Rainwater must be free of oil sheen. • Date, time, and signature of employee who performed drainage and/or manager.

Security [40 CFR 112.7(e)(9)]

Security is critical to preventing accidental releases or vandalism by the public. The security measures required under SPCC are simple precautions that greatly reduce the risks of vandalism and undetected spills.

The perimeter of a facility should be protected with good lighting, fencing, and locked gates. Motion detectors and video cameras may be used for added security. Access to the facility should be restricted during nonbusiness hours. Starter controls for fuel pumps should be locked. Any valves that will allow the direct outflow of product are also required to be locked (e.g., water draw-off, sampling, and sparge valves). It is recommended that tanks and pipelines be labeled and kept out of public access areas. Loading/ unloading connections and pipelines should be capped or blank-flanged when they are not in service.

Spill Prevention Training [40 CFR 112.7(e)(10)]

A large number of spills is caused by operator error; therefore, training and briefings are important for the safe and proper functioning of a facility. Training encourages up-to-date planning for the control and response to a spill and an understanding of the facility's spill prevention controls and SPCC Plan. Regular safety and spill prevention briefings should be held to facilitate discussions of spill events or failures, malfunctioning equipment, and recently developed precautionary measures. Also, one person must be designated accountable for spill prevention at the facility.

Owners and operators are responsible for properly instructing drivers, tank gaugers, pumpers, and any other operating personnel involved in oil operation systems in the operation and maintenance of equipment to prevent the discharge of oil and applicable pollution control laws, rules and regulations. All employees should be familiar with the SPCC Plan and where it is kept or have a copy of the Plan available for their use.

Records of employee training and spill prevention briefings for personnel should be included in the SPCC Plan and kept for a minimum of three years.

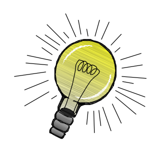
Owner/Operator Relationship

Both the owner and operator, whether private individuals, corporations, or other entities, must take responsibility for ensuring compliance with the SPCC requirements.

An owner who leases property should ensure that the operator has adequately engineered his/her operations to meet the SPCC Plan requirements and that the SPCC Plan is adequate and being properly implemented (through monitoring). To that end, the owner may wish to include language in the lease that states clearly that the operator is responsible for promptly providing to the owner true, accurate and complete copies of any and all documents relating to the SPCC and FRP requirements.

To facilitate compliance, owners and their operators should keep each other informed. It is important to remember, however, that responsibilities required by law cannot be changed by contract. Therefore, **the owner may be held liable for an operator's failure** to prepare and/or implement an SPCC Plan which is consistent with the requirements of 40 CFR Part 112.

Troubleshooting



Facilities should consider current operations and how they can be improved to prevent spills and meet the regulatory requirements by conforming with good engineering practices. To this end, the questions and answers appearing below are based on practices observed at vehicle service facilities by federal, state, and local regulatory agencies. *Some of the issues and practices discussed are best management practices (BMPs) and may be supplemental to the regulatory requirements. Others may be essential to achieving* *compliance with the SPCC requirements or state regulations.*

- ***What types of procedures or equipment are in place at the facility to prevent and control a product discharge in the event of a human error or equipment malfunction?***

  Some facilities have simple systems in place, such as ditches completely surrounding the facility, that can hold all of the surface runoff from rain and oil that may spill. Others may have complex operations which continuously rely on equipment, such as oil-water separators, for preventing discharges while draining rainwater. Equipment should be closely monitored to ensure proper operation. Oil-water separators and outfalls should not automatically discharge to a waterway and should be equipped with block valves.

  Make sure that all valves are working properly. Shutoff valves that do not work properly may result in spills.

- ***How does the facility prevent pipeline ruptures?***

  Monitor pressure in piping systems, especially in the summer when temperatures may be high. Regulate pumping pressure so that the piping pressure does not exceed its pressure rating. Couplings and connections should have pressure ratings compatible with piping systems. Pressure-test piping before returning it to service and at regular intervals while in service.

- ***How is equipment protected from vehicle impact?***

  All electrical equipment, tanks, pipelines, and cable trays should be protected by installing bumper poles and other physical barriers and warning signs, including signs identifying truck clearances.

- ***Has your facility considered the possibility of lightning causing oil spills?***

  Lightning can strike transformers, tanks, and other equipment containing oil. When it does, it frequently results in a combination of fire and spilled oil. The chance of lightning striking equipment can be significantly decreased by proper lightning protection.

> EPA's Chemical Emergency Preparedness and Prevention Office has prepared an "Alert" entitled *Lightning Hazard to Facilities Handling Flammable Substances.* For a copy, phone (800) 424-9346 or (703) 412-9810.

- ***What is the facility's protocol for maintaining equipment and correcting visible oil leaks?***

  Institute a regular preventive maintenance program to prevent leaks, equipment malfunctions, and spills. Replace worn seals, fittings, and other parts before they leak or break. Wastewater or stormwater treatment system equipment, including oil-water separators, must be regularly maintained to prevent clogging and other problems that may lead to equipment failure.

- ***Is the facility's training program adequate to maintain personnel awareness of the spill prevention techniques described in the SPCC Plan and correct operating procedures?***

  Owners or operators are responsible for instructing their personnel in the operations and maintenance of equipment to prevent the discharges of oil and applicable pollution control laws, rules, and regulations.

  Refresher training should be conducted at regular intervals. Training should include testing to ensure that personnel, especially new hires, have an understanding of the concepts discussed.

- ***Is spill control equipment strategically located and is the storage area adequately stocked based on the facility's needs?***

  Keep spill kits containing absorbent pads, booms, disposal containers or bags, an emergency response guidebook, and a fire extinguisher in a cabinet or locker near the storage and loading/unloading areas. Regularly inspect the cabinet where emergency spill response supplies are kept to ensure the cabinet is properly stocked.

- ***Does the facility have a spill response plan?***

  For those facilities not required to prepare a facility response plan under 40 CFR Part 112.20, it is still recommended to develop a spill response plan. Provide this plan to the fire department and local response agencies. Have frequent drills and invite local responders to participate.

Facility Construction and Design

There are a variety of ways for a facility to be designed and constructed to achieve compliance with the SPCC requirements. Facilities may differ greatly in the types of diversionary structures and spill control equipment employed. Small facilities may utilize simple yet effective methods while large facilities may employ state-of-the-art technologies to treat contaminated drainage, achieve overfill protection on tanks and tank trucks, conduct integrity testing, provide facility security, and train employees. Facilities should also consult industry associations, which specifically identify technical and engineering standards for the design and construction of tanks and pipelines; cathodic protection of tanks and pipelines; AST tank bottom liners; tank inspection, repair, alteration, and reconstruction; tank cleaning; and tank overfill protection. These standards may assist the facility in identifying good engineering practices and achieving compliance with the SPCC requirements.

SUMMARY OF COMMON INDUSTRY STANDARDS	
Underwriters Laboratory (UL) Standard 142 *Steel Aboveground Tanks for Flammable and Combustible Liquids*	This standard applies to steel atmospheric tanks intended for aboveground storage of noncorrosive, stable, flammable, and combustible liquids that have a specific gravity not exceeding that of water. The standard does not apply to API Standard 650, 12D, and 12F tanks.
National Fire Protection Association (NFPA) Code 30A *Automotive and Marine Service Station Code, Chapters 1 and 2*	This standard applies to automotive and marine service stations and to service stations located inside buildings (special enclosures). The code does not apply to service stations that dispense liquefied petroleum gas, liquefied natural gas, or compressed natural gas as motor fuels.
National Fire Protection Association (NFPA) Code 30 *Flammable and Combustible Liquids Code, Chapter Two*	This standard applies to all flammable and combustible liquids, including waste liquids (except those that are solid at 100 degrees Fahrenheit or above and those that are liquefied gases or cryogenic). Chapter Two, Tank Storage, applies to aboveground and indoor storage of liquids in fixed tanks and portable tanks with storage capacities of more than 660 gallons.
American Petroleum Institute (API) Standard 620 *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*	This standard addresses large field-assembled storage tanks that have a single vertical axis of revolution and contain petroleum intermediates and finished products, as well as other liquid products handled and stored by the petroleum industry.
API Standard 650 *Welded Steel Tanks for Oil Storage*	This standard provides material, design, fabrication, erection, and testing requirements for vertical, cylindrical, aboveground, closed- and open-top, welded steel storage tanks in various sizes and capacities.
API Recommended Practice 651 *Cathodic Protection of ASTs*	This recommended practice describes the corrosion problems characteristic in steel ASTs and associated piping systems and provides a general description of the two methods used to provide cathodic protection.
API Recommended Practice 652 *Lining AST Tank Bottoms*	This recommended practice describes the procedures for achieving effective corrosion control in ASTs by application of tank bottom linings to existing and new storage tanks.
API Standard 653 *Tank Inspection, Repair, Alteration, and Reconstruction*	This standard pertains to carbon and low alloy steel tanks built in conformance with API Standard 650 or 12C and provides criteria for the maintenance, inspection, repair, alteration, relocation and reconstruction of welded or riveted, nonrefrigerated, atmospheric pressure ASTs after they have been placed in service.
API Recommended Practice 920 *Prevention of Brittle Fracture*	This recommended practice addresses toughness levels for pressure vessels to prevent failure by brittle fracture.
API Standard 2015 *Safe Entry and Cleaning of Tank*	This standard provides guidelines for the development of safety practices for planning, managing, and conducting work in atmospheric and low pressure storage tanks.

SUMMARY OF COMMON INDUSTRY STANDARDS	
API Recommended Practice 2350 *Overfill Protection for Petroleum Tanks*	This recommended practice provides guidelines for establishing operating procedures and for selecting equipment to assist in the reduction of overfills.
API Standard 2610 *Design, Construction, Operation and Maintenance and Inspection of Terminal and Tank Facilities*	This standard compiles various standards, specifications, and recommended practices developed by API and other entities for managing terminals and tanks.

ACKNOWLEDGMENTS

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USDA REA, 1993. *Design Guide for Oil Spill Prevention and Control at Substations* , Bulletin 1724-302.

U.S. Environmental Protection Agency, 1995. *SPCC/OPA Manual*. U.S. EPA Region VIII, Ecosystem Protection and Remediation Preparedness Team. Denver, Colorado.